

Life Situations, Emotions, and Extrasystoles

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The occurrence of cardiac arrhythmias in association with emotional stress is a common clinical observation (2,6,8,13,14). To explore the validity of the inference that such extrasystoles occur as part of the organism's reaction to life situations, a systematic study was made of 12 unselected patients displaying extrasystoles. In most of these patients palpitation was the presenting complaint; in a few it was an incidental finding. In 5 of the subjects other arrhythmias occurred as well.

In all instances a detailed history was obtained; a complete physical examination and indicated laboratory procedures were performed to determine the presence and nature of any functional or structural heart disease or other abnormality. A series of interviews was conducted over varying lengths of time up to one year and totalling up to forty hours, during which a life history and personality study were obtained. An evaluation was also made of the current life situation and the emotional responses thereto. As the patient was followed detailed inquiries were made into the circumstances of each episode of arrhythmia. Among these, such factors as exercise, infection, tobacco, alcohol, and coffee were carefully noted as well as attitudes, feeling states, and life situations. Every effort was made to distinguish the influence of the former group of factors from that of the latter group.

In addition to the day to day observations of these subjects, attempts were made to determine under what controlled circumstances arrhythmias might occur. The subjects were taken to a quiet room where they lay on a comfortable bed and where extraneous disturbing factors were kept at a minimum. Frequent intermittent recordings were made from a direct-writing electrocardiogram, while the patients were interviewed by a physician—usually over a period of about an hour. At times the interview was directed towards topics to which the patient was known to be sensitive or events which had previously been associated with the

complaint of palpitations; at other times, neutral conversation was introduced or the patient was given reassurance and suggestions to relax. Apart from the recording of the electrocardiogram the interview was not significantly different from the regular clinic interviews. Throughout the observation period the subject's reaction was recorded as fully as possible and notes were made of changes in facial expression and voice, tearfulness, flushing or pallor, tremors and agitated movements. These observations were supplemented by notes on the patient's subjective evaluation of his feeling state. One typical interview is reported in detail later (Case 12).

Observations

A. Emotional States Associated with Extrasystoles

EXTRASYSTOLES AND ANXIETY: Anxiety was by far the most frequent emotional concomitant of extrasystoles in these patients. Anxiety was a prominent feature in 11 of the 12 patients in this group. It was displayed in speech, behavior, and posture. There were often physical symptoms of anxiety such as muscle tension, and 8 of the patients showed sinus tachycardia repeatedly. In keeping with this, the patients were usually timid, dependent, and somewhat passive. These features are illustrated in the following patient.

Case 1

A 34-year-old housewife complained of palpitations and chest pain. She had been told that she had rheumatic heart disease twelve years previously; this was her first intimation of any serious illness and no episodes of acute rheumatic fever or chorea were recalled by the patient or her mother.

The parents of the patient had been immigrants from Bohemia. Her father had made a modest living as a piano builder. He had been a chronic alcoholic who wasted his earnings at gambling and, although not abusive to the children, he was frequently away from home; on his return, quarrels would break out between the patient's parents and the home was continually in a turmoil. Her mother reacted to this situation with a fretful, nagging attitude towards the children, deep hostility towards all men, and a generally pessimistic outlook on life.

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The patient recalled that she had been "nervous" all her life. In childhood she had had many friends, but as she grew older she withdrew from them and was chiefly preoccupied with earning money in order to keep the home going. Eventually she made a "good" marriage and had one son.

When she was 27 her father died of heart disease and at about the same time a younger sister was also found to have developed rheumatic heart disease. When she was 31 the patient began to notice on occasion a "skipping" of her heart. At 33 she developed pain in the left upper chest just above the breast. Two physicians who saw her seemed pessimistic concerning the significance of the pain. One said that if certain injections did not relieve the pain the breast would have to be amputated. He also volunteered to her that by the age of 42 she would be an invalid. Following these statements the patient reached a state bordering on panic with a marked increase in her anxiety and in its manifestations; palpitations became much more prominent. She largely neglected her domestic duties, became depressed and irritable towards her family and friends, and spent most of her time absorbed in gloomy thoughts about her health. Each time she felt pain she was overwhelmed by fear of cancer or of imminent death from heart disease. "When I get a pain in the morning, I just sit down; the whole day is ruined."

The heart was found to be enlarged and beating rapidly at a rate of 100. There were frequent extrasystoles and also the characteristic murmurs of mitral stenosis and insufficiency and aortic insufficiency. It was noted that a sinus tachycardia was present (rate 90-100) every time the heart was examined and the patient stated that examinations made her "nervous."

The patient was almost continually anxious. She regularly displayed tachycardia, dry mouth, cracked voice and fidgety, purposeless movements of the hands and body. When reassured that she would not "drop dead" as she feared, she immediately replied, "Oh then I am going to have a long, lingering illness and suffering." She said she could not bear to be alone, but had to be with people; yet she was frightened and tense with strangers and showed little active interest in social affairs. Her husband reported considerable irritability in her behavior at home, but anxiety was much more pronounced than hostility.

Following a biopsy of the left breast for diagnostic purposes, the patient felt reassured and also had occasion to care for her sister's child while its mother was in the hospital. During the six-week period of this preoccupation her symptoms almost entirely disappeared; the pain never quite ceased but the "skipped beat" disappeared and she felt in good health. When the sister left the hospital and reclaimed her child the patient's anxiety and cardiac symptoms returned. Since cancer had been excluded by the biopsy, she felt strengthened in her conviction that the pain came from her heart.

During this exacerbation of anxiety and symptoms the patient was interviewed in the laboratory while electrocardiographic tracings were taken. Discussion of her health and family problems was associated with an increase in the heart rate and in the number of auricular extrasystoles. After being diverted and induced to laugh, the frequency of extrasystoles diminished. The interviewing physician then reassured her, asked her to try to relax and left the room. Immediately, however, the patient's thoughts reverted to the topics discussed, anxiety returned and extrasystoles increased and persisted until the end of the period of observation.

Following this interview and others during which the patient was given further reassurance her symptoms diminished gradually. The extrasystoles first decreased in frequency and then disappeared completely both in her own awareness and on physical examination. She continued to exhibit tachycardia, however, whenever her heart was examined, the rate increasing from 80 to 95 on one such occasion. The tachycardia was accompanied by three extrasystoles in three minutes. At the next visit a few weeks later she felt cheerful, optimistic, and had no symptoms. Examination of the heart again revealed a rate of 102 but there were no extrasystoles.

Comment: This patient demonstrates several features repeatedly found in other members of this group. There was long-standing anxiety which had more recently been accentuated and focused on the heart. The patient was defensive in her general attitude and rarely displayed hostility or overt aggression. Tachycardia was a prominent feature during routine examinations. The rheumatic heart disease was not solely responsible for the extrasystoles since they could easily be related to the life situation, attitudes, and emotions of the patient. Relief of anxiety was consistently associated with abolition of the extrasystoles.

It has been observed by Miller and McLean (20) that extrasystoles occurred in patients with long-standing dependence on one parent towards whom all hostile feelings were repressed. In 5 cases known to them this parent had heart disease. The occurrence of extrasystoles in the patient was interpreted as a further identification with this parent and a punishment for the hostility. In the following patient these psychodynamic features were prominent and certain of them were present in other patients of this series.

Case 2

A 30-year-old accountant of Italian parentage came to the New York Hospital complaining of "nervousness" and palpitations.

The patient's father and mother were both some-

what excitable, but kindly, gentle people who had overprotected the patient in childhood. The family was described as exceedingly close and the members were unusually dependent upon each other.

His father had prospered in early life, but following severe pneumonia, he worked little and gradually lapsed into a state of invalidism which persisted for the last twenty years of his life. He continued to be the active head of the family and his decisions were asked and accepted. He had high blood pressure and later developed palpitations. The patient was extremely solicitous of his father's health and worried and talked much about it. He often felt his father's pulse, detecting an intermittency in it. Despite his attachment to his father, the patient was aware that his father had been "babied" as an invalid and that his incapacity was out of proportion to the evidence of physical disease. In dreams and unguarded moments he showed hostile feelings towards his father, but he never expressed such feelings during his father's life.

The patient's mother also had high blood pressure and a paternal aunt, a brother-in-law and his father-in-law all had coronary artery disease, so that there was ample opportunity for the development of anxiety about heart disease.

The patient gave evidence of anxiety long before it became centered on his cardiovascular system. He showed nail-biting until twenty and a tic-like movement of his head dated back to early childhood. He had frequent muscle tension headaches. In youth he had one episode of palpitations and on another occasion his heart was found unusually rapid in a physical examination. He was much disturbed by obsessive thoughts, chiefly of sexual content. In his personal relations he was timid and dependent and in the management of problems tended to be passive rather than aggressive.

When he was 27 a younger brother was killed in the war and the patient felt guilt and anxiety over this. Two years later the patient's father died after a brief terminal illness. The patient reacted again with guilt and anxiety. One month later he had an anxiety attack with flushing and palpitations and thereafter had repeated episodes of the same symptoms and others, such as dyspnea and chest pain.

When he was first seen, the patient exhibited the usual manifestations of anxiety; the examination of the heart revealed no structural lesion but a persistent rapidity of rate which was around 85. On early examinations no extrasystoles were found. Later when his anxiety was accentuated during the illness of his child he said; "I want another examination today. I feel a falling sensation in my chest and my pulse stops. I know because I feel it skips a beat; that's enough to get me nervous." When the examination began extrasystoles were found to be occurring at the rate of three per hundred beats, but, as the examination progressed, anxiety increased and his face flushed. Extrasystoles also increased in frequency to twenty-five per hundred

beats. As the patient was reassured about the palpitations his anxiety abated somewhat and the extrasystoles became less frequent. The pulse rate at this examination was between 88 and 94. On a later date the patient was interviewed while electrocardiographic tracings were taken. Although displaying much anxiety and tachycardia (with a rate of 110), a regular sinus rhythm persisted throughout the interview.

During a series of therapeutic sessions in which he was strongly reassured and allowed to discuss freely his conflicts, the patient gradually improved and his symptoms diminished. Palpitations ceased to be a complaint and extrasystoles were not again observed.

Comment: Although palpitations are commonly attributed to increased awareness of the heart or to sensations produced by increased rate or stroke volume (25), careful examinations of patients with this complaint reveal a high incidence of cardiac arrhythmias at the time of the palpitations. In Friedman's series of patients with neurocirculatory asthenia 22 per cent were found to have various cardiac arrhythmias when experiencing palpitations (10). As in this patient, however, extrasystoles may only be found when anxiety is moderate. When more severe anxiety is present there is usually a marked tachycardia and the excitability of the sino-auricular node exceeds that of a potential focus in the myocardium.

Levy *et al.* (18) have observed an increased incidence of structural heart disease in patients with habitual tachycardia. The occurrence of extrasystoles in these patients may impair the blood supply to the heart and thus provide one mechanism for the development of structural disease.

Associated with long-standing anxiety, many (although by no means all) of the patients had great difficulty in the expression of hostile feelings or those which might be interpreted as hostile. The following patient showed extrasystoles when the expression of hostility broke through her devotion to her mother.

Case 3

A 51-year-old housewife came to the hospital with the complaint of palpitations. The patient was found to have a blood pressure of 200/100. The examination of the heart was unremarkable, apart from the frequent occurrence of extrasystoles. The electrocardiogram was normal.

The patient had been subject to anxiety attacks for many years, and she had often related her complaint of palpitations to feelings of anxiety. During one interview she described the anxiety she felt when people saw her house untidy. The source of this anxiety was then traced back to her childhood in which the

patient's mother had been perfectionistic and demanding about the housework done by her children. The patient's relations with her mother were overtly congenial, but she had a constant desire to please her mother and rarely achieved satisfaction in doing this. She felt that her younger sister was somewhat favored. Throughout this discussion the patient showed no obvious anxiety judged by her words and voice. Rather suddenly, she complained of palpitations, without being conscious of anxiety. Upon examination of the heart the rate was found to be 94 with extrasystoles occurring every three to six beats. The patient's neck and face were flushed. The heart had been examined shortly before this conversation and no extrasystoles were found, so that their occurrence may be accurately related to the interview. The patient stated that she had not thought the topics discussed disturbing to her, but they evidently touched on matters to which she was sensitive.

Comment: Some instances of apparently spontaneous extrasystoles may be related to concomitant emotional disturbances of which the patient may not be conscious. In these instances only a careful analysis of the conversation and thoughts of the patient will reveal the relevant factors.

EXTRASYSTOLES OCCURRING AS PART OF THE REACTION TO PAIN. It has been noted previously (24) that extrasystoles may arise during pain. This is illustrated in the following case.

Case 4

A 55-year-old stockbroker was admitted to the Psychiatric Division of the New York Hospital for the treatment of alcoholism. His mother had died when he was 12; his father had largely rejected him, and he was able to derive little emotional support from his step-mother or other members of the family. As a child he was mild and unaggressive; he suffered from enuresis and had frequent nightmares. Although in his early business life he was quite successful, he became increasingly anxious when dealing with new situations provided by his business and sought to bolster his morale with alcohol. The suicide of his father and the death of a respected father-in-law accentuated his feeling of insecurity.

For some years before his admission he had noted palpitations and in the hospital was found to have frequent extrasystoles. The heart rate was usually found to be rapid, averaging around 80 when awake with frequent excursions into the 90's. There was

strongly suggestive electrocardiographic evidence of myocardial disease, but the physical examination showed no other cardiac abnormality than the extrasystoles.

The opportunity for observing the occurrence of the extrasystoles in this patient occurred during a plethysmographic study of blood flow in his finger. When the test was started there were frequent extrasystoles; during the first minute of the test the heart rate was 76 and extrasystoles occurred at the rate of thirteen per hundred beats. During the next minute the heart rate was 70 and there were fourteen extrasystoles per hundred beats. These were presumably associated with mild anxiety connected with the beginning of the test. The extrasystoles then ceased entirely for ten minutes during which time the patient remained quiet without talking and the heart rate averaged about 74. At the end of this period a blood sample was drawn for a chemical determination. There was slight pain associated with the drawing of the blood and extrasystoles recurred at the rate of ten per hundred beats and then diminished and disappeared again.

OCCURRENCE OF EXTRASYSTOLES WITH ELATION AND ABJECT FEAR:

Case 5

A 40-year-old male had had hypertension and anxiety for ten years. His anxiety appeared to be related to excessive attachment to his mother with antagonism to his father and to father-figures. He also gave evidence of homosexual conflicts and was frequently impotent in heterosexual relationships. In the summer of 1947 he encountered frustrations connected with his work as a writer and also in the courtship of a girl whose enthusiasm for him was poorly sustained. His blood pressure was reported to be elevated and he complained of sensations of tightness in the occipital region and of general tension. After rest the physician found his blood pressure lower. As the anniversary of his father's death from heart disease approached however, he became aware of increased feelings of tension and dejection. His girl went away temporarily and he attempted sexual relations with another girl. In this setting he developed a coronary occlusion with a posterior myocardial infarction.

Following the infarction the patient's convalescence was prolonged by depression, fatigability, and weakness. He showed great anxiety about his heart and became particularly anxious whenever any examination of it was undertaken, fearing the communication of some dreadful news.

One day the patient was in the laboratory two

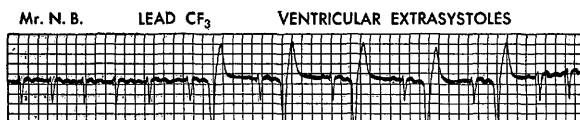
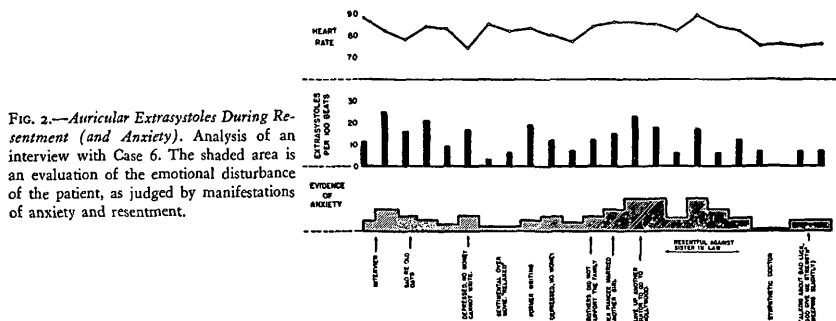


FIG. 1.—*Ventricular Extrasystoles During Fear.* Electrocardiograms Lead CF₃ of Case 5 when relatively relaxed (left) and frightened (right). The rhythm has been interrupted by five ventricular extrasystoles.



months after his discharge from the hospital and showed his usual mixture of depression and anxiety. This however, became intensified as the chest leads of the electrocardiogram were taken. Earlier he had become alarmed by hearing some physician discuss the findings in his electrocardiographic chest leads. The heart rate increased from 76 to 92. He turned pale, sweated and his facial expression was one of alarm. He remarked "I feel sort of jittery," and immediately after he had said this, five premature ventricular contractions interrupted the previously regular rhythm (Fig. 1). At the same time he complained of a "thumping" sensation in his chest. Following this there were no other extrasystoles.

About a month later the patient was feeling somewhat better, and at times felt that he had completely recovered. One of his plays in connection with which he had had many disappointments before the coronary occlusion, was proposed for production by an important group of amateur actors. The patient was delighted with this prospect and a meeting was arranged with the prospective producers. While this was taking place the patient experienced intense feelings of pleas-

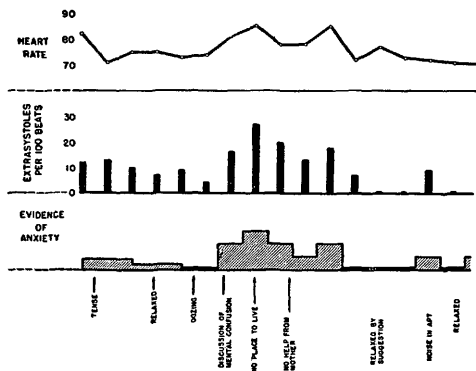
ure and elation at the opportunity which had arisen and the compliments being paid him. Again he was aware of a "thumping" similar to that which he had experienced in the laboratory and it seems probable that he was experiencing extrasystoles again.

EXTRASYSTOLES AND RESENTMENT: Although anxiety was a more prominent feature than expressed hostility in these patients, extrasystoles were also associated with resentment in some. The following patient illustrates this occurrence.

Case 6

A 60-year-old woman had suffered from palpitations for many years.

The patient had been raised under comparatively affluent circumstances in a family of superior social standing in the South. While she was at college an older brother suddenly married and his wife shortly afterwards had a child. The father of the patient diverted money from the patient to her brother so that she had to leave college. She felt intense resentment against her brother and, more particularly against



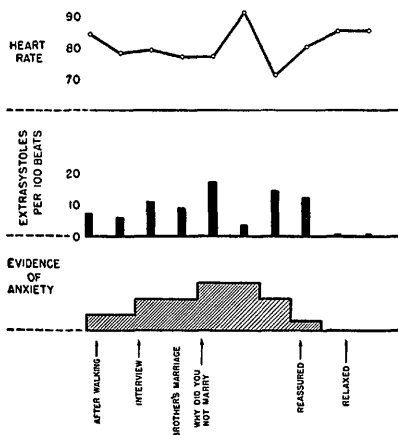


FIG. 4.—*Auricular Extrasystoles During Resentment (and Anxiety)*. Analysis of another interview with Case 6. The shaded area is an evaluation of the emotional disturbance of the patient, as judged by manifestations of anxiety and resentment. Note the diminution in extrasystoles during a period of increased heart rate associated with continuing emotional disturbance.

her sister-in-law, who accused her of implying to friends that her brother's marriage had been precipitated by a pregnancy. Later the patient declined an opportunity for marriage and instead became a Hollywood writer for a time. Still later after she devoted eight years of her life to the care of her mother who was invalided by angina pectoris, the father mismanaged his money and thus wiped out the patient's prospects of a legacy. Notwithstanding all her trials the patient did well as a writer and journalist and for many years supported herself competently until the deterioration of her memory and episodes of mental confusion made it difficult for her to hold jobs. Finally she was forced to "go on relief" and live in surroundings of poverty. It was about this time that she first began to notice palpitations.

Physical examination revealed generalized arteriosclerosis and slight hypertension of 150/100. The heart rate was usually in the neighborhood of 80. There was an apical systolic murmur of grade 2 intensity and one plus pitting edema of the shins. The patient exhibited marked dyspnea on exertion and was unable to complete half a standard exercise tolerance test. The electrocardiogram was normal apart from the presence of numerous auricular extrasystoles which increased in number after exercise. The mental confusion of which she complained was manifested to others chiefly in circumstantiality and some difficulty with dates.

The patient was moderately depressed and showed

considerable anxiety about her health and her distressing financial condition. She expressed resentment towards her family who had given her no assistance and many of her remarks suggested a paranoid distortion of the facts. Hostility was also expressed towards social service workers. The patient considered it humiliating to accept charity.

She was interviewed in the laboratory on several occasions and the findings are illustrated in Figures 2, 3, and 4. During each of these interviews a close correlation was found between the occurrence of auricular extrasystoles and the emotional state of the patient. The latter changed readily with the flow of conversation. The feeling states of the patient which were associated with extrasystoles varied between anxiety (about her health and financial condition) and resentment (toward her family). During periods of relaxation when the patient was reassured or diverted the extrasystoles diminished or disappeared. It will be noted that the heart rate was more rapid than the usual rate for recumbent women. Figure 4 shows one period when, during a marked increase in heart rate, the extrasystoles diminished in number.

Comment: As illustrated in the first patient it would appear that when anxiety is associated with a marked increase in heart rate the excitability of the sinoauricular node increases and the extrasystoles from the ectopic focus are less likely to occur.

During the course of the interviews there was no subjective sensation of palpitation. On one occasion however, she had been asked if she had felt a sense of relief when her mother died. On the afternoon following the interview she telephoned that she was having severe palpitations and that her "heart was jumping all over the place" and "going like a trip-hammer." Following the interview she evidently mulled over the discussion and gradually developed an emotional state characterized by guilt and tension over the death of her mother and resentment at the physician for his presumed implication. Presumably these palpitations arose from frequent extrasystoles which were observed at other times when she had this complaint.

After these interviews the patient was followed in the clinic. For a time her situation improved markedly, she became more prosperous, was more cheerful, and felt well. Her heart rate became slower and was found between 60 and 70 instead of around 80. Extrasystoles were absent when the patient was quiet, but they could still be brought out by discussion of her health or by exercise. The patient's tolerance for exercise was much greater. Her mental confusion was much improved. As the patient had large numbers of extrasystoles it is not improbable that some impairment of her cerebral circulation resulted from them.

Later when the patient fell into financial difficulties

again, extrasystoles returned and she was digitalized. After this extrasystoles were not again observed except on one occasion when the patient became intensely frightened over some blurring of her vision. On this occasion she showed hyperventilation and extrasystoles every four beats.

Comment: This patient was considered to have arteriosclerotic heart disease. Extrasystoles occurred in this patient in response to the different stresses of exercise and unpleasant life situations. These stress-producing situations increased the work (indicated by tachycardia in both instances) and the excitability of a heart already damaged by advanced arteriosclerosis.

Following an improvement in the life situation the mood and affect improved and there occurred an associated increase in exercise tolerance, a diminished heart rate and a decreased susceptibility to palpitations and extrasystoles.

B. Extrasystoles During Discussion of Events Previously Associated with a Cardiac Arrhythmia

Case 7

A 74-year-old woman came to the New York Hospital complaining of recurrent episodes of palpitation.

Her early life had been spent in relatively comfortable circumstances but she married an irresponsible, unfaithful man who failed to support her. When she was 45 a brother and a nephew to whom she had been closely attached died within a short period. The patient then developed a mild hemiplegia and was found to have hypertension. The following year she divorced her husband and then dedicated her energies to their only child, a boy. By working hard she was able to send him to a private school and by further sacrifices sent him through college and medical school. At one point during this program the patient was so short of funds that her house was seized for taxes. To make matters worse, her son married the next year and did not help the patient to recoup her fortunes. Instead he claimed that the patient had rejected him by sending him to boarding school and that he had put himself through college by his own efforts. The patient continued to support herself ably for a time, but as she grew older became less and less productive and was finally forced to accept help from the Department of Welfare.

Despite the long-standing hypertension this patient had no cardiac symptoms until the age of 73. At this time she was out of work, harassed by financial worries, and living in a boarding house with a rather uncongenial landlady. The patient began to be aware of pounding of her heart, particularly as she lay on her left side at night. One evening, two weeks later and after a violent argument with the landlady she

noticed pain in her chest and acceleration of her heart. She went to bed, and thirty minutes later noted accentuation of the symptoms and associated pain in the left arm and chest and shortness of breath. The symptoms lasted an hour.

Following this attack the patient continued anxious about her health and the persecutory attitude of the landlady towards her. In the succeeding four weeks she had several similar attacks and then reported to the New York Hospital.

Upon examination the patient was found to have advanced generalized arteriosclerosis, moderate obesity, and some osteoarthritis. The heart was moderately enlarged and there were systolic murmurs of medium intensity at the apex and in the aortic area. The rate was usually around 60. The blood pressure was 176/92. There was no evidence of congestive heart failure but dyspnea on exertion was noted. She was later seen in attacks of paroxysmal auricular fibrillation which she said were similar to the ones she had had before admission to the clinic.

Superficially the patient seemed hostile, almost paranoid, towards her relatives and even towards others who were trying to help her. Underlying this, however, was deep anxiety and some depression about her present condition. She constantly ruminated over the humiliation of accepting support from the Department of Welfare and the financial destitution which forced her to come to a clinic. To this had latterly been added anxiety about her health, which she made a brave but futile attempt to conceal. The resentment she so freely displayed was apparently related to the desperation of her life situation since it disappeared when the latter improved.

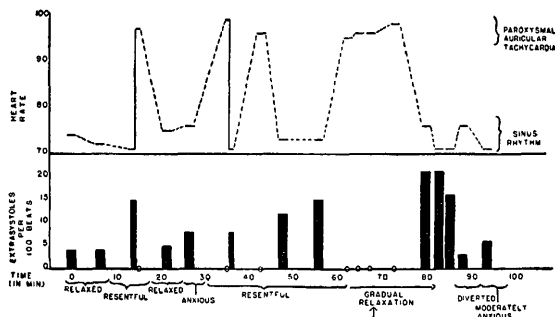
On her first visit she recounted with considerable agitation the story of her attacks of tachycardia and of the trouble with the landlady which had preceded the first one. As she did this she complained that her heart "felt different." Upon examination a regular sinus rhythm without extrasystoles was found. She continued to talk and became even more agitated, exhibiting chiefly anxiety with some resentment directed toward the landlady and her neglectful relatives. Once more she complained of her heart and when it was examined again numerous extrasystoles were found to be interrupting the rhythm. As she was diverted and relaxed again the extrasystoles disappeared.

Case 8

A 61-year-old male came to the New York Hospital with the complaints of intermittent palpitations and shortness of breath.

In childhood he had "growing pains" and at 13 a febrile episode lasting a week was attributed to rheumatic fever. At 18 a murmur was mentioned for the first time, and he was advised to "slow down." He limited his activities for a year but then resumed normal life, participating in many sports such as tennis until he was in his fifties.

FIG. 5.—*Auricular Extrasystoles During Discussion of Events Associated with Arrhythmias.* The heart rate and number of extrasystoles were determined from an electrocardiograph which was recorded approximately one minute of each five during the 95 minute interview. The solid portion of the heart rate curve indicates the periods during which the electrocardiograph was recorded. Auricular leads showed changes in the configuration of the P waves indicating that the more rapid heart rates (95 to 99) were due to paroxysmal auricular tachycardia arising in a focus near the sino-auricular node. During the discussion of events previously associated with arrhythmias the patient showed anxiety and resentment and changes in the rhythm occurred at these times. Moderate degrees of emotional disturbance were associated with increased



frequency of extrasystoles and more severe degrees with paroxysmal tachycardia.

Attacks of palpitations began at 40 in a setting of frustration in his marriage and were attributed to paroxysmal auricular tachycardia and auricular fibrillation. The first occurred during a visit to his home by his wife's aunt, whom he considered unduly aggressive and possessive toward his wife. The attack was actually precipitated during an episode of frustrated anger. He dated his earliest feelings of anxiety from this period.

He had two attacks during the aunt's visit and then no more for twelve years, despite the fact that during this time his marriage ended in divorce and he lost his business and home and had to "go on relief."

At the age of 53 the attacks recurred. At this time he was living with his sisters amid considerable domestic friction. He was also interested in a girl who vacillated in her regard for him. He had six attacks of tachycardia in about a year until he moved out of his sister's house and broke off with the girl. After this he felt much less tension and had no more attacks for four years.

At the age of 58, while working in a bank, he felt imposed upon by the senior officials of the branch because they often kept him after hours. The attacks of tachycardia recurred. At about this time he noted also some shortness of breath on exertion which alarmed him and brought anxiety about his heart. He continued to work off and on, finding that his attacks were most apt to occur on Thursdays and Fridays at the end of the working week. They diminished during periods of unemployment.

The patient was found to have a congenital deformity of both thumbs and of the left arm, which was smaller than the right one. The heart was much enlarged in all diameters. There was a loud, harsh systolic murmur heard over the entire precordium and a softer, but distinct diastolic rumble heard at the

apex. The electrocardiograph showed right axis deviation, prolonged P-R and QRS intervals, and right bundle branch block. Angiocardiographic study of the heart showed a patent interauricular septal defect. This, together with the evidence of mitral stenosis, made it probable that the patient had the congenital heart syndrome known as Lutembacher's syndrome, on which had been imposed arteriosclerotic changes.

The predominant feature of the patient's personality was anxiety, which was chiefly centered around his heart. It was evident from the study of the patient that his anxiety extended back to a period when he had no concern for his heart. It had been his habit to deal with problems by withdrawal from them rather than by decisive action. Although he had recently developed a ready irritability, he had formerly endured prolonged frustration before he permitted expression of his feelings.

The patient was interviewed on two occasions in the laboratory, and the results are analyzed in Figures 5 and 6. It can be seen (Fig. 5) that when the patient was relatively relaxed at the beginning of the observation period, there was a sinus rhythm with a rate of 75 and rare auricular extrasystoles. As the patient showed anxiety or resentment in discussing his heart or some unpleasant life situation, there was first an increase in the number of extrasystoles and then an abrupt change in the heart rate to about 95. Special auricular leads revealed slight changes in the configuration of the P waves which make it probable that the more rapid rate was due to episodes of paroxysmal auricular tachycardia arising in a focus close to the sinoauricular node. During the tachycardia, the extrasystoles for the most part diminished in number. As the tachycardia yielded to the slower rate, (which happened abruptly also), extrasystoles again appeared until the patient was completely relaxed. During sustained tachycardia (Figure 6), there was a variation

in the occurrence of superimposed extrasystoles with the emotional state.

Comment: It appears that in this patient moderate degrees of emotional disturbance were associated with increased numbers of extrasystoles. When the emotional disturbance was greater one of the ectopic foci apparently took over the basic rhythm from the SA node. In general, during these interviews a close correlation was shown between emotional disturbance and either increased numbers of extrasystoles or tachycardia. As in Case No. 7, discussion of events previously associated with arrhythmias (i.e., frustrations in marriage and at the bank) was accompanied by recurrence of arrhythmia. Extrasystoles were also increased by focusing his attention on his heart.

As in Case No. 7 advanced structural heart disease was present which appeared to have increased the susceptibility of the heart to extrasystoles related to stresses in the life of the patient. The management of the life situations appeared to be of cardinal importance in therapy. Associated with therapeutic interviews, reassurance, and support there was a pronounced decrease in the frequency of tachycardia and extrasystoles.

C. Extrasystoles Superimposed on other Arrhythmias

Two patients have been studied in the laboratory while showing paroxysmal auricular arrhythmias which were related to their emotional state. During interviews the emotional state changed so that extrasystoles became superimposed on the underlying arrhythmias. This occurred in Case 8 and in the following patient.

EXTRASYSTOLES WITH AURICULAR FIBRILLATION:

Case 9

A 40-year-old man over a period of some years came to the New York Hospital with palpitations which were due to attacks of paroxysmal auricular tachycardia and auricular fibrillation.

He was born of immigrant Russian Jewish parents and brought up in circumstances of poverty. The mother was the dominant member of the family. Her attitude was tyrannical and at one time she even had the patient arrested for a minor misdemeanor. He tried a number of jobs haphazardly but throughout most of his life he had supported himself by disposing of illicit goods. At the age of 34 he was markedly obese and was found to have hypertension with a blood pressure of 150/105. At about this time he had his first episode of palpitations.

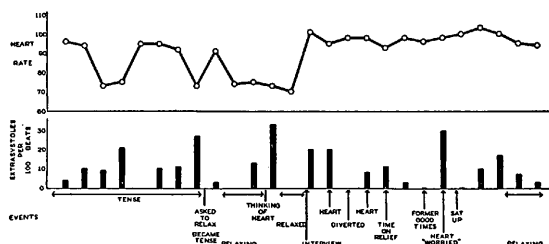
At 36 he married a gentle girl who was ten years younger. His wife proved, like his mother, to be rather a domineering personality and they had frequent quarrels. After being ejected by his mother he lived with his wife's family. He was obliged to accept both financial support and humiliation from them. He felt considerable resentment towards them and much of this was transferred to his wife, who, he felt, had not adequately protected him from the assaults of her relatives.

In this patient as in others, anxiety seemed the largest component of the personality structure. There was a considerable amount of hostility ventilated to his physicians, but it was almost impossible for him to express this in the presence of those toward whom it was directed. His attitude was generally passive and dependent. He was constantly and fruitlessly seeking support from his mother, wife, and relatives. He resented their failure to supply it more abundantly, but he was afraid that any complaint would lead to their giving him less.

As noted the patient was markedly obese. The blood pressure was elevated, being usually around 160/110. Apart from the arrhythmias frequently encountered there was little remarkable about the examination of the heart. A striking feature, noted in many of the other subjects of this group, was tachycardia even when there was a sinus rhythm. The rate was never found lower than 78 and varied between this figure and 100. He said he rarely slept the night before he was to report to the hospital and when he was seen he usually displayed other signs of anxiety, such as dry mouth and a tense, cracked voice.

Following a painful humiliation at the hands of his brother-in-law the patient had, as usual, said noth-

FIG. 6.—Auricular Extrasystoles Superimposed on Paroxysmal Auricular Tachycardia. Analysis of another interview with Case 8 with similar results. The frequency of extrasystoles was found to vary with the emotional state of the patient even during paroxysmal auricular tachycardia which was sustained throughout most of the interview on this occasion.



ing and restrained himself. He came to the laboratory the next day in a state of nervous tension and experiencing palpitations which had begun shortly after the episode. Electrocardiographic tracings revealed auricular fibrillation. He was urged to discuss the events leading to the attack. He began to talk about the unpleasantness at home and as he did so he became more tense. He attempted at first to restrain the emotion but, being encouraged to express himself freely, he began to cry and sob with mixed feelings of resentment and depression. Six seconds after the onset of weeping numerous ventricular extrasystoles appeared, twenty-four occurring in twenty-four seconds. They persisted throughout the sobbing, but disappeared completely after he had relaxed. The basic rhythm of auricular fibrillation continued throughout and the ventricular rate of 164 was approximately the same during the period of observation (Fig. 7).

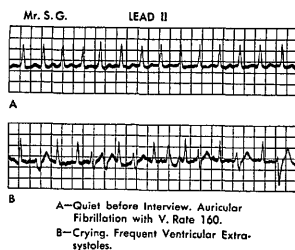


FIG. 7.—Ventricular Extrasystoles Superimposed on Auricular Fibrillation During Dejection and Resentment. Electrocardiogram of Case 9. The upper tracing shows auricular fibrillation which had begun the previous night in a setting of suppressed resentment. In the lower tracing numerous ventricular extrasystoles have been superimposed on the underlying rhythm during the expression of dejection and resentment accompanied by weeping.

D. Variations in Frequency of Extrasystoles with Emotional Changes

In all the patients studied the life situations and emotional states of the patients were the most significant factors in the occurrence of extrasystoles. The following case illustrates marked variation in the frequency of extrasystoles with changes in the emotional state related to the life situation.

Case 10

A 45-year-old Jewish woman came to the New York Hospital after having suffered from various types of palpitations for six years. At another hospital she had been shown to have paroxysmal auricular tachycardia. The episodes of paroxysmal tachycardia in this patient were closely related to her life situation and

have been discussed in detail in another report (9). Following the use of digitalis and quinidine paroxysmal tachycardia ceased but frequent palpitations persisted. From the patient's complaint of "skipped beats" when extrasystoles were found on auscultation, it may be assumed that the palpitations were due to extrasystoles.

The patient's father was a humble tailor who suffered from heart disease and eventually died of it. He was irascible and hostile to his family, although the patient was his favorite child. The patient's early life was, in her opinion, clouded with anxiety and squalor. She formed the ambition of improving herself and rising above her early surroundings.

She became tacitly engaged to a boyhood acquaintance, who much resembled her father, in her early twenties. At the same time she had some reservations about his ability to provide her with the sensitive understanding she sought. She met and fell in love with another man who showed the qualities lacking in her fiancé. This second suitor, however, seemed impractical and unambitious and was finally rejected by her in favor of the first one.

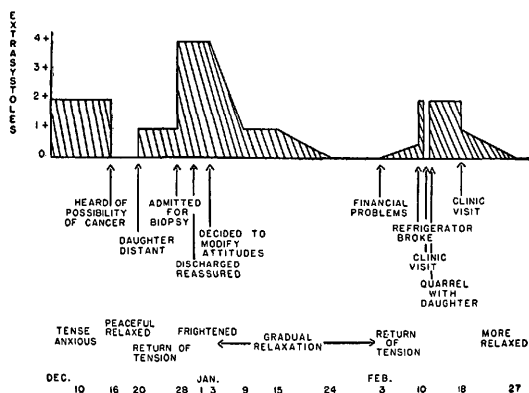
Her marriage did not go well and was almost immediately regretted by the patient. She resumed her association with her second suitor to whom she spoke of her troubles. Sexual relations (which the patient had with both men throughout her marriage) were unsatisfactory. Her husband likewise felt dissatisfied and drifted into affairs with other women. He became increasingly irritable and even violent and the patient finally divorced him after fifteen years of marriage. At the height of her tension and indecision about her divorce the patient had her first episode of paroxysmal tachycardia.

Following her divorce, the patient was unable to marry her other man who had remained faithful to her. She felt him still casual and irresponsible and did not wish to lose her alimony in a second gamble at marriage. She maintained a sort of common-law marriage with him, but never brought herself to formalize it. During this period frequent extrasystoles occurred and the patient sought relief for these.

Although there was no history of rheumatic fever, examination of the patient showed a large heart with characteristic murmurs of mitral stenosis and insufficiency. There was no evidence of congestive heart failure. The heart rate was often increased and auricular extrasystoles were observed. The auscultation of the latter coincided with the patient's complaints of "skipped beat."

The patient was a tense, restless individual who displayed unusual degrees of anxiety and hostility. She was passive in the conduct of her affairs although aggressive in blaming her unsatisfactory state on others. She attributed her failure to attain marital happiness to the men involved. She was compulsive in her housekeeping and planned her life far into the night while tossing with insomnia.

FIG. 8.—Frequency of Extrasystoles in Relation to Life Situations and Emotional States. The figure shows the frequency of extrasystoles during a ten week period in Case 10. Frequency of extrasystoles is estimated on a scale of one to four plus.



As the patient was followed in the clinic enquiry was made at each visit about the frequency of extrasystoles and these were then related to the events of the preceding week and the patient's emotional state. Figure 8 illustrates the changes in frequency of extrasystoles over a ten-week period thus studied. Frequency of extrasystoles were graded on a one to four plus scale.

At the beginning of the observation period the patient showed a daily frequency of extrasystoles which was graded two plus. She had been sent to the gynecology clinic about a cervical erosion for which vaginal smears were taken. A message was sent to her one day from this clinic requesting a visit from her for the purpose of repeating the smear test. Immediately the patient became apprehensive of cancer. She abruptly modified her attitudes towards her lover and children, felt close to them and that all the friction and disputes which they had been having were trivial and unworthy. A sense of peace came over her and at the same time extrasystoles completely disappeared. This period of calm and freedom from symptoms lasted five days and was interrupted when the patient's daughter seemed to her aloof and distant. Former resentments were rekindled and extrasystoles returned. A few days later the patient was admitted for a decisive biopsy of the cervix. On the day of her admission she felt more extrasystoles than ever before and was almost continually aware of them. Following the biopsy and reassurance she continued anxious for some time and continued to have this high frequency of extrasystoles. Then she sought to recapture the feelings she had had when she first suspected cancer and tried to modify her attitudes. The extrasystoles diminished accordingly, and for a time disappeared completely. Tension returned when the patient became worried about the irregularity of her alimony pay-

ments. One night her refrigerator broke and she attempted to repair it herself, became tired and frustrated in doing so, and had frequent extrasystoles afterwards. The next day she again relaxed after another clinic visit and felt well until the following day when she quarrelled with her daughter. During the ensuing week she continued tense and resentful at her former husband's financial irresponsibility and her daughter's apparent rejection of her. Following another clinic visit the patient once more felt less hostility and tension and as she relaxed extrasystoles again diminished and disappeared.

E. Factors Altering the Susceptibility to Extrasystoles

The susceptibility of the heart to extrasystoles varies much from time to time. When this susceptibility is increased extrasystoles may occur under stresses which were not previously associated with them. The following patient illustrates increase in the susceptibility to extrasystoles during and after an infection.

Case II

A 44-year-old female medical research worker showed no evidence of structural heart disease and had always enjoyed good health and energy. Anxiety was not an habitual feature of her personality. In the spring of 1948 she had a severe otitis media which lasted about ten days. Throughout this period she noted for the first time in her life frequent extrasystoles. On one occasion these were recorded so that the subject, who was a trained observer, was able to correlate the symptom of palpitation with the arrhythmia. Following the otitis media, the subject had no more extrasystoles until some weeks later, when she was called upon to speak

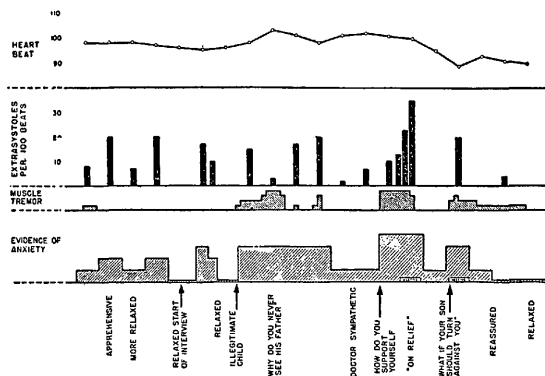


FIG. 9.—*Ventricular Extrasystoles During Anxiety.* Analysis of an interview with Case 12. The lower shaded area is an evaluation of the emotional disturbance of the patient as judged by manifestations of anxiety. The middle cross-hatched area is an evaluation (on a one to four plus scale) of muscle tremor recorded on the electrocardiogram. Extrasystoles diminished during one period of sustained anxiety when the heart rate increased.

before a group of women. Just before she went on the platform to give her talk she was aware of mild feelings of anxiety and also of extrasystoles. As she began to lecture both the anxiety and the extrasystoles disappeared.

Comments: In this patient the excitability of the myocardium may have been increased during the infection. Some degree of this altered state persisted and made the heart susceptible to the stress associated with the delivery of a lecture a few weeks later. The subject had not previously observed extrasystoles at other times of anxiety.

Alterations in the susceptibility of the heart to extrasystoles were also related to the life situations and emotional states, even in the presence of structural heart disease, as in the following case.

Case 12

A 55-year-old woman came to the hospital with the complaint of palpitations and "nervousness."

The father of the patient was often depressed and her mother stern and domineering. The patient gave early evidence of anxiety as a child in frequent nightmares, nail biting and feelings of "nervousness" when in the company of her mother. She had planned a career in music but at the age of 17, after the onset of bilateral chorioretinitis, abandoned it. She was by no means incapacitated by her inadequate vision and was able to get around easily and even to read large type. However, she did little for herself and subsided into a state of dependency upon her family, who, in turn, omitted her from the family councils and in general treated her like a child. After the death of her parents, a younger sister continued this practice, assumed supremacy among the siblings, handled all financial transactions, and freely directed the patient's life. In her thirties the patient became pregnant without marriage. Retrospectively at least, she felt that the

man involved would have married her, but for the meddlesome interference of her family which drove him away. Her family urged her to allow the illegitimate child to be adopted, but she elected to raise him herself. This she did, not unsuccessfully, with the help of her family and some financial aid from the father. Relations with her sister continued to deteriorate and a few years before her first visit to the clinic palpitations began, associated with altercations with her sister. She finally withdrew from the latter's home and "went on relief."

Examination of the patient revealed an obese woman with moderate hypertension as high as 176/94. There was evidence of an enlarged heart and a systolic murmur was noted at the base. An X-ray plate showed tortuosity and sclerosis of the aorta. There was a distinct tendency to tachycardia, the heart rate during early interviews averaging around 100. There were numerous ventricular extrasystoles. The electrocardiogram showed left axis deviation, but was otherwise normal. The patient showed herself to be an anxious, passive, dependent person, whose feelings of hostility were largely repressed.

Electrocardiograms made throughout an interview are analyzed in Figure 9. During the preliminary period she showed alternate relaxation and apprehension, the latter appearing when she focused her attention on the test being made. During the periods of anxiety, ventricular extrasystoles were more frequent. Finally, it was possible to relax her completely, and it will be noted that at this time she had no extrasystoles. The interviewing physician then entered the room and began to talk to her; immediately she became apprehensive as to what this might portend and at the same time further extrasystoles were recorded. The physician then by his words and manner reassured her and she relaxed once more, again with a disappearance of the extrasystoles. The conversation was now channeled into the topic of her illegitimate child and the patient immediately became agitated,

flushed, and fidgeted on the bed. Extrasystoles again appeared and continued throughout the period of agitation. At one point, as in Figure 4 of Case 6, the heart rate increased and the extrasystoles diminished in frequency during sustained anxiety. Presumably this was because the excitability of the sino-auricular node temporarily exceeded that of the ectopic focus. After the above topic had been discussed, the physician adopted a sympathetic attitude which indicated understanding and approval of the patient's management of her problems. At this time the extrasystoles greatly diminished in number, without entirely disappearing. A portion of the recording made at this time is shown in Figure 10A. The patient was then asked how she was supporting herself. Immediately she became agitated, flushed, turned her head away, made restless movements and shortly afterwards started to weep as she recounted the fact that she was not able to work and was, in fact, on relief. At this time the extrasystoles increased so that one was occurring every three beats (Figure 10B). After a further period of comparatively neutral conversation, the extrasystoles again diminished (Figure 10C). The question of her future welfare was then raised and she was asked if she was sure her son would support her and not later turn against her. This distressed her almost as much as the previous question and extrasystoles increased in number. Finally the patient was praised for the scholastic achievements of her son, diverted by pleasant conversation, and she became more composed and at ease. Concomitantly the extrasystoles disappeared. From the figure it can be seen that throughout the interview,

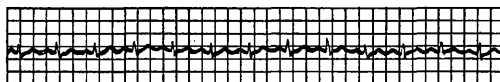
which extended over about forty-five minutes, the rapid heart rate changed comparatively little.

The patient was followed after this for about six months, during which interviews with therapeutic orientation were conducted. On three of these occasions electrocardiograms were taken during the interview, as before. At the second interview, two weeks after the one recorded above in detail, the patient's life had been going well and she was in a happy mood. Although some of the topics to which she was known to be sensitive were discussed with her, she remained undisturbed by them and no extrasystoles were recorded. Two weeks later a third interview was undertaken. On this occasion she was anxious, as she had been earlier, and reacted with tension to the discussion of the topics to which she had previously been sensitive. Frequent extrasystoles appeared, but disappeared again as she was induced to relax. A fourth interview was conducted about six weeks later after considerable improvement in her general condition had been effected; she felt better and had noted fewer palpitations. On this occasion the patient became disturbed, as before, by the discussion of the previous topics. At least three times during this interview she became agitated, flushed in the face, and tearful. No extrasystoles were recorded, however, although anxiety and tension appeared to be equal in degree to that associated with extrasystoles during the first and third interviews. The heart rate during all four interviews was rapid and varied between 90 and 110, with an average of about 100.

Following this the patient continued to improve symp-

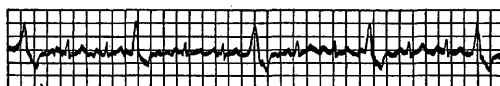
MRS. A. H.

LEAD II



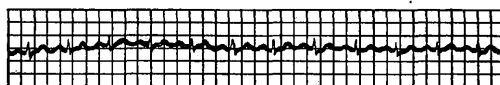
A

RELAXED



B

"ON RELIEF"



C

RELAXING AGAIN

FIG. 10.—*Ventricular Extrasystoles During Anxiety.* Electrocardiographic tracings during part of the interview with Case 12 analyzed in Figure 9. The three strips shown are taken from the periods before, during and after the maximal disturbance when the patient was discussing her financial difficulties. In the middle strip the evidence of muscle tension associated with the anxiety can be seen.

tomatically, and three months after the last experimental interview reported almost complete disappearance of the palpitations. No extrasystoles were detected after the third interview. After the fourth it was observed that the pulse rate at successive visits was slower, dropping to 84 at the last two visits. The blood pressure fell gradually to 132/70. Furthermore, the patient's performance of a standard exercise tolerance test (as judged by return of the pulse rate to the resting value) was improved.

Comment: It seems evident that the susceptibility to extrasystoles of this structurally diseased heart was altered during a period of improvement in the life situation and emotional responses of the patient. A period of comparative well-being apparently increased the resistance of the heart to the stress produced by discussion of personal conflicts. It may be assumed, therefore, that prolonged stress in this patient and in others, in some way alters the excitability of the heart so that it is predisposed to arrhythmias. Tachycardia and circulatory inefficiency are other manifestations of stress on the heart in anxiety (25).

Discussion

It is generally accepted that extrasystoles occur when there is some alteration of the excitability of a portion of the heart. The irritability of this portion of the heart may temporarily exceed that of the sino-auricular node, or it may be refractory to the direct spread of the excitation wave but respond a little later to the same wave, reaching it in a roundabout course, thus acting as an ectopic focus for the production of an extrasystole.

Many factors have been held responsible for this altered excitability, but they fall into three main groups: structural heart disease, metabolic or pharmacologic influences, and nervous or "reflex" mechanisms. The evidence for the production of extrasystoles by a neural mechanism is considerable. Extrasystoles have been observed to occur as a result of stimulation of the carotid sinus and as part of the reaction to noxious stimuli applied to various parts of the body (1,24). In cats under chloroform anesthesia, extrasystoles have resulted from stimulation of the central ends of the cut vagi. This response has been abolished by incision of the hypothalamus (5). Extrasystoles have been produced by electrical (4) and chemical (7,15) stimulation of the hypothalamus. It has also been postulated that intracranial lesions in man (tumor, vascular accident) have been responsible for the sudden development of extrasystoles as the result of stimulation of

medullary centers (16, 19). The greater incidence of extrasystoles during operations on the head and neck as compared to those on other parts of the body has been attributed to stimulation of the vagi during surgery (17). In experiments on dogs whose hearts were sensitized with barium chloride, groups of extrasystoles were noted during stimulation of the peripheral ends of the cut vagi and after sympathetic stimulation, which caused sinus or ventricular tachycardia (23).

Thus, stimuli reaching the heart by efferent fibers of both branches of the autonomic nervous system may be responsible for the production of extrasystoles. This inference is substantiated by the observation that the injection of either sympathicomimetic (12, 22) or parasympathicomimetic (3, 11, 21) drugs may produce extrasystoles as well as other arrhythmias. That a neural mechanism is involved in the production of extrasystoles during an emotional disturbance is suggested by the fact that the change in emotional state and the extrasystoles in the patients here reported occurred simultaneously.

It is necessary to consider, however, not only the immediate precipitating mechanisms but the underlying susceptibility of the heart to increase in its irritability. In this the factors of structural heart disease and metabolic alterations may be of prime importance. That structural heart disease may predispose the patient to the occurrence of extrasystoles even when these are closely related to emotional changes is shown by the large percentage of patients with structural heart disease (66 per cent) in this group. Exercise, also, by temporarily exhausting the heart, may alter its irritability and increase the number of extrasystoles. These usually diminish during the exercise when the excitability of the sino-auricular node predominates, but are augmented afterwards when the rate slows and the effect on the heart muscle can be shown.

Exercise is a situation which calls forth a general bodily mobilization which includes the circulatory apparatus, as evidenced by increase of heart rate and stroke volume. A similar mobilization occurs in response to unpleasant life situations which call forth defensive activity in the subject (26). In the earlier and milder phases of the disturbance tachycardia alone may be found. If the disturbance is sufficiently intense or sustained, however, the irritability of the heart may be increased to the point where it is susceptible to the production of extrasystoles. The relation of cardiac mobilization to this increased susceptibility is shown not only by the finding of habitual tachycardia in most of these pa-

tients; it is apparent also in the observation that in 9 patients on whom the heart rate was accurately determined, tachycardia was present in all but one at the time of observed extrasystoles. Those patients who were seen during periods of remission without extrasystoles showed slower heart rates than than were found during the periods of frequent extrasystoles.

Should the stress become even greater, either the excitability of the sino-auricular node may again increase, (and if it predominates the arrhythmia will be superseded by a sinus tachycardia) or the ectopic focus may become firmly established with the development of a more serious paroxysmal or permanent arrhythmia.

The stress to which the heart has been exposed during the preceding weeks or months becomes, therefore, no less important than the immediate situation in determining the cardiac response to a stimulus. Thus just as prolonged exercise may exhaust the cardiac muscle, so may prolonged mobilization in defensive attitudes associated with stressful life situations.

The personality structure, attitudes, and general behavior of these patients gave evidence of such a generally defensive reaction. In most, anxiety far outweighed hostility and sometimes approached abject fear. They tended to be timid, indecisive, and passive. They dealt with problems more often by evasion than decisive action. The habitual tachycardia displayed by most of the patients was evidence of somatic mobilization and also of cardiac stress arising from this behavior pattern.

Where the susceptibility of the heart is transiently increased by concomitant disease, as in Case 11, extrasystoles may occur under circumstances of slight stress. Likewise, where the stress is particularly great they may occur when the heart is structurally sound. Most of these patients exhibited a combination of the two factors. Prolonged disturbances in the life situations and emotional states of the patients were associated with defensive mobilization of the heart. In the majority of subjects such mobilization is not harmful, but in those with structural heart disease the excitability of the heart may be sufficiently affected by the stress for the production of extrasystoles.

With the occurrence of extrasystoles or some other arrhythmia, the defensive mobilization becomes less efficient, even to a degree which may impair the blood flow to the brain, as in Case 6. The heart itself may be damaged by the inadequacy of the circulation. The arrhythmia, therefore, indicates a failure of adaptation to the external threat.

Even more important than this, it indicates that the heart is being damaged by the stress to which it is subjected. The occurrence of an arrhythmia in patients with structural heart disease has, in the past, merely drawn attention to the underlying heart disease which has been regarded as a sufficient explanation for the arrhythmia. Careful study of the life situation may reveal, however, some environmental stress to which the subject is reacting with defensive mobilization beyond his heart's capacity. Appropriate therapy would include manipulation of the life situation, and efforts to decrease the patient's need for defensive mobilization by helping him deal more constructively with his problems and conflicts.

Summary and Conclusions

1. In a group of 12 unselected patients with extrasystoles, the life situation and emotional state of the patient were found to be relevant to the occurrence of the arrhythmias in each patient.
2. Extrasystoles and associated anxiety were observed in these subjects experimentally during a discussion of topics to which they were known to be sensitive or which had previously been associated with extrasystoles.
3. The excitability of the heart may be significantly altered by prolonged hyperactivity of the cardiac muscle during anxiety with tachycardia and increased stroke volume. Structurally diseased hearts are less able to stand the strain of such hyperactivity and more readily develop an altered excitability than do normal hearts. Extrasystoles are therefore particularly common in patients with structural heart disease who exhibit prolonged anxiety and the associated reaction of cardiac mobilization.
4. The treatment of subjects with extrasystoles should include attention to the life situation and the patient's adjustment to it, not only for its effect on the arrhythmia but in relieving the stress on the heart, of which the extrasystoles are an indication.

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American Neurological Association

At the Seventy-Fourth Annual Meeting of the American Neurological Association held in Atlantic City, New Jersey, June 13-15, 1949, the following officers were elected for the year 1949-1950:

President:	Dr. Henry W. Woltman
1st Vice-President:	Dr. Johannes M. Nielsen
2nd Vice-President:	Dr. E. Jefferson Browder
Secretary-Treasurer:	Dr. H. Houston Merritt
Assistant Secretary:	Dr. Charles Rupp